

Application No.: 09/437,607
Attorney Docket No.: VRD 3003.01

Claim Rejections – 35 U.S.C. 112, first paragraph

Claims 1-4, 8-18, 38-40, 48, 54 and 60 are rejected under 35 U.S.C. 112, first paragraph, for allegedly containing new matter. It is alleged that support for a pH range “of 5.6 to 9.5” cannot be found in the specification or claims as originally filed.

Applicants respectfully disagree. It is pointed out that at least claim 1 as originally filed recited “elevating the pH of the soil”. One of ordinary skill in the art would understand “elevating” the pH of soil as including elevating soil pH to a range of 5.6 to 9.5. Indeed, without any limitation on the upper level of pH, one of ordinary skill in the art would recognize that the soil might be elevated to an even higher pH. It is pointed out that the specification actually recognizes such a scenario, indicating that while for metal extraction in general, the preferred pH ranges between about 5.5 and about 7.0, *see* page 8, lines 23-24, “a more alkaline pH may be used” in certain situations, for example when accumulating nickel and the iron oxide of the soil is low. *See* page 8, lines 18-20. Accordingly, the originally filed application clearly provides support for a pH of about 5.5 to 7.0 and higher (i.e., more alkaline), including a pH range of 5.6 to 9.5 as claimed.

Claim Rejections – 35 U.S.C. 112, second paragraph

Claims 4 and 38-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite.

Regarding claim 4, it is alleged that the phrase “limestone equivalents” is unclear. Applicants respectfully disagree. As explained in the Response Under 37 C.F.R. 1.111 dated December 8, 2003, the paragraph spanning pages 8-9 of the application states that the phrase “limestone equivalent” is intended to encompass bases that have the same alkalinity as limestone. The recognition of bases with such alkalinity is, of course, a simple matter for those of ordinary skill in the art.

As for claims 38-40, it is alleged that the recitation of “a factor” of 2, 3 or 4 is unclear. Applicants respectfully disagree. Regarding the basis for this measurement, the paragraph

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spanning pages 5-6 of the application clearly explains that the concentration of metal in the above-ground plant tissue of the hyperaccumulator plant exceeds the concentration of metal in the soil by a factor of at least 2. Indeed, independent claim 38 similarly recites that the concentration of metal in the above-ground plant tissue of said at least one hyperaccumulator plant exceeds the concentration of metal in said soil by a factor of at least 2. Accordingly, one of ordinary skill in the art would recognize a factor of 2 as referring to 2 times the concentration of metal in soil, whereas a factor of 3 would represent 3 times the concentration of metal in soil, and so on.

Applicants therefore respectfully urge that all claims are clear and definite.

Claim Rejections – 35 U.S.C. 112, first paragraph

Claims 1-4, 8-9, 38-40, 48-49 and 54-60 are rejected under 35 U.S.C. 112, first paragraph, as lacking enablement.

Applicants respectfully disagree.

Applicants wish to address those comments set forth in the Office Action.

At pages 3-4 of the Office Action, it appears to be alleged that there is no enablement for the use of any nickel- cobalt- and manganese-hyperaccumulator that accumulates the amounts of heavy metals from soil, as claimed. However, Applicants cannot urge strongly enough that the claimed invention is fully enabled, emphasizing that enablement only requires that the disclosure contain sufficient information so that one of ordinary skill in the art may make and use the claimed invention. *See* MPEP 2164.01. Indeed, in this case, each claim itself allows one of ordinary skill in the art make and use the invention. Considering claim 1, for example, it is clear all that is required to practice the invention is to adjust soil pH and cultivate at least one metal-hyperaccumulator plant in the soil to permit metal accumulation, as claimed. While the metal-hyperaccumulator plant must be a nickel- or cobalt-hyperaccumulator plant as claimed, identifying such a plant is a simple matter for one of ordinary skill in the art. Not only does the application itself disclose a large number of suitable hyperaccumulator plants, *see e.g.*, pages 10-17, but one of ordinary skill in the art could easily identify other hyperaccumulators. As noted at

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page 10, lines 7-12 of the application (and as claimed), the nickel- and cobalt-hyperaccumulators of the invention satisfy certain metal accumulation criteria, considering that the plant is grown in soil where the plant naturally occurs. Accordingly, hyperaccumulator plants of the claimed invention may be identified by growing and observing a plant under normal conditions, a simple matter for one of ordinary skill in the art. For instance, with respect to the invention of claim 1, by growing a plant under normal conditions and measuring metal accumulation, to determine whether the plant accumulates nickel at about 1,000 mg or more of nickel per 1kg dry weight of plant tissue, nickel-hyperaccumulator plants suitable for the invention are readily identified. A similar process for identifying cobalt-hyperaccumulator plants would apply, and again is a simple matter for those of ordinary skill in the art. While such a process is expected to identify hyperaccumulator plants as well as non-hyperaccumulator plants, it is emphasized that the test of enablement is not whether any experimentation is necessary, but whether such experimentation is undue. *See id.* It is submitted that a process such as this, which amounts to simple growing and observation, cannot be considered undue experimentation. Moreover, it should be recognized that any requirement that the claims recite specific metal-hyperaccumulator plants could unfairly penalize Applicants, as such a requirement may result in others attempting to practice the invention, while arguing that the plants utilized are not specifically recited in the claims, even where the plants meet the definition of hyperaccumulator plant claimed. While Applicants would consider such an argument to be frivolous, even the potential for such an argument could hinder the patent protection Applicants seek. Accordingly, it is urged that the invention is fully enabled, as one of ordinary skill would be able to make and use the invention as claimed.

At page 5 of the Office Action, it appears to be alleged that there is a lack of enablement because providing a pH of at least 5.6 only increases hyperaccumulation for nickel and not other metals. Applicants respectfully submit that Patent Office appears to have missed the point of the invention. It is pointed out that no claim requires an increase/improvement in metal accumulation at a pH of at least 5.6 as compared to a pH below 5.6. Rather, all that is required is an accumulation of metal by a hyperaccumulator plant at the soil pH claimed. As has been stated

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previously, such accumulation is in contrast to all disclosures of the prior art, which teach pH reduction or lower levels of pH are required for metal accumulation in hyperaccumulator plants. It is recognized that there may be some confusion on the part of the Patent Office concerning the term "increasing" in certain preamble language. Thus, as was explained in the Response Under 37 C.F.R. 1.111 dated December 8, 2003, it is again pointed out that the preamble and body of claim 1 (as well as other claims with similar language) are consistent, the preamble referring to "increasing" the amount of metal, while the body of the claim indicates that metal is "accumulated", and thus the amount increased, in the above-ground tissue. That is, while metal accumulation occurs, thus increasing the amount of metal in plant tissue, there is not necessarily a greater amount of metal accumulation as compared to when a different or lower soil pH is utilized. However, as is shown throughout the application (e.g., Tables 1-3), a soil pH of at least 5.6 may result in greater accumulation for certain metals. Moreover, the application at page 18, lines 6-9 explains that even where there is accumulation at a soil pH of at least 5.6, metal sequestration may be improved with calcium, fertilizers and chelating agents. In other words, while improvement in the amount of metal accumulated is not required, such improvement is not prohibited.

Finally, Applicants note that at pages 5-6 of the Office Action, it appears to have been alleged that metal accumulation may depend on elements not claimed, for example calcium concentration and Ca:Mg exchangeable ratio. Again, however, Applicants submit that the Patent Office has missed the point. As explained above, the claimed invention concerns metal accumulation at a higher soil pH, for example a pH of at least 5.6, which is in contrast to all teachings of the prior art which indicate a lower pH is required for accumulation. In fact, Tables 1-3 of the application show the accumulation of nickel and cobalt (and manganese) at soil pH levels of at least 5.6, thereby clearly demonstrating enablement for the invention as claimed. It is again noted that while the Patent Office appears to have confused the issue of metal accumulation with the accumulation of greater or larger amounts of metal, as discussed above, what the claimed invention requires is metal accumulation at the soil pH claimed. In sum, metal accumulation as claimed is clearly demonstrated.

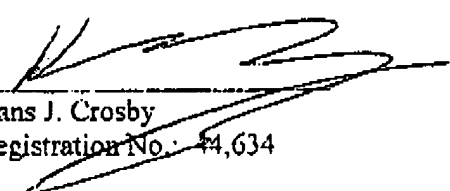
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Applicants therefore urge that all claims are fully enabled.

In view of the remarks above, Applicants respectfully submit that this application is in condition for allowance and request favorable action thereon.

In the event that the fees submitted prove to be insufficient in connection with the filing of this paper, please charge our Deposit Account Number 50-0578 and please credit any excess fees to such Deposit Account.

Respectfully submitted,
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